

COMMONWEALTH OF PENNSYLVANIA

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DEPARTMENT OF INTERNAL AFFAIRS  
James F. Woodward, Secretary.

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# TOPOGRAPHIC AND GEOLOGIC SURVEY

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## THE TOPOGRAPHIC AND GEOLOGIC SURVEY A BRIEF SUMMARY OF ITS WORK SINCE 1919.

By

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Pennsylvania, like every other forward-looking State or Nation, has an organization for surveying, mapping, and disseminating information regarding its topography, geology, and mineral resources, including its soils and waters. Started nearly 100 years ago (1836) the work has been carried on by four successive State Geologic Surveys, separated by short intervals, of which the present Survey, established by Act of June 7, 1919 is the fourth. This paper is an abstract from an administrative report covering the work done since 1919.

The work naturally has two sides; (1) the surveying, mapping and collecting of information regarding the State's topography, geology and mineral resources; and (2) the dissemination of this information verbally, by letters, and by published reports and maps.

Information service. The latter phase of the work may be treated first. It is estimated that about 12,000 persons have visited the office of the Survey since 1919 in search of informa-



tion, while about 60,000 inquiries by mail have been answered. In addition the State Geologist has given many talks, usually illustrated, on the State's geology and mineral resources, in about 50 towns in the State, and he and other members of the Survey have prepared a hundred or more articles, some of considerable length, for the press and technical journals. Many conferences have been held with Chambers of Commerce to discuss local resources and their possible development. The Survey has responded to a large number of requests from other departments of the State Government, and from towns for examinations or advice regarding problems involving geology.

The present Survey has published 26 reports, some in a second edition, covering over 4,000 pages and a large number of color maps, plates and illustrations. At the present time 6 reports and a new geological map of the State are being printed, 11 reports are completed and awaiting publication and 12 reports are nearly ready for publication, with still others in progress. The reports now printed occupy about 18 inches of shelf space. When the material now ready or nearly ready is printed the whole will occupy not less than 4 feet of shelf space. In addition to the printed reports 101 mimeographed bulletins of from 3 to 28 pages have been prepared in order to give advance information or to present the results of smaller studies.

Topographic mapping. The final basis of all geologic and other surveys and maps is the accurate topographic map of the State being made by the Survey in cooperation with the U. S. Geological Survey, on an equal division of the cost. The Federal Survey does all the field work and the engraving and printing of the maps. More than one-third of the State Survey's appropriation has gone into this work.

The area of the State is 45,126 square miles. Topographic mapping to 1919 had covered 25,400 square miles, or 56.3 per cent of the State. From 1919 to 1929 inclusive, 11,344 square miles or 25.1 per cent of the State was mapped, making a total of 36,744 square miles or 81.4 per cent. This leaves 8,382 square miles to be mapped, mostly in the wooded areas of northern Pennsylvania. At the present rate that will require 8 years to complete.

Mineral resources. A study of the requests coming to the Survey revealed a very large percentage asking for information on the State's mineral resources. The emphasis for the first 10 years has therefore been centered on broad studies of these resources, as very few of the former publications on these resources are available for distribution.

Coal naturally came first, with a reconnaissance study of the bituminous coal fields by J. D. Sisler, supplemented by a careful estimation of the State's bituminous coal resources by townships and beds, by J. F. Reese. Then 755 samples of coal were cut by L. D. Woodward, Erle S. Hill and others for analysis by the U. S. Bureau of Mines. A general bulletin on coal was prepared by the State Geologist. Other studies followed on coal losses and mining methods in the bituminous fields by J. D. Sisler, and in the anthracite fields by D. C. Ashmead. In these two investigations the State Survey cooperated with the U. S. Coal Fact Finding Commission and U. S. Bureau of Mines. Later a detailed study was made of anthracite culm and silt by J. D. Sisler, D. C. Ashmead, and Thomas Frazer in which the Pennsylvania Water and Power Resources Board and U. S.



Bureau of Mines cooperated. The results of this work are published in seven reports totalling about 1,700 pages, as follows:

Bulletin M6, Pt. I, General Information on Coal,  
Ashley, 241 pp.

Pt. II. Bituminous Coal Fields of Pennsylvania, Sisler, 511 pp.

Pt. III. Bituminous Coal Resources, Reese  
and Sisler, 153 pp.

Pt. IV. Analyses of Bituminous Coal, U.  
S. Bureau of Mines, 268 pp.

M4. Bituminous Coal Losses and Mining Methods in  
Pennsylvania, Sisler, 216 pp.

M8. Anthracite Losses and Reserves in Pennsylvania, Ashmead, 71 pp.

M12. Anthracite Culm and Silt, Sisler, Frazer,  
and Ashmead, 263 pp.

The river coal industry was studied in 1919, and again in 1930.

The interest aroused by the McKeesport gas pool led to a brief study of the oil and gas fields in 1920 and the publication of a preliminary report on them by Ashley and J. F. Robinson (Bull. M1, 79pp). Later a study of the oil resources in coal and carbonaceous shales of Pennsylvania was completed by C. R. Fettke and published as Bulletin M2, 119 pp. Professor Fettke then began a very detailed study of the Bradford oil field, and of the deeper oil and gas sands to discover criteria by which they might be distinguished. Both of these investigations are nearing completion. In 1927, Mr. Sisler began a comprehensive study of the oil and gas fields of the State. This is completed and a 1,200 page manuscript and new oil and gas map are nearly ready for the printer.

In 1921 Professor B. L. Miller, assisted by Lloyd Fisher and C. E. Lawall began a comprehensive survey of the limestones of Pennsylvania. Bulletin M7, Limestones of Pennsylvania, 368 pp., was published in 1925. The discovery that the value of this bulletin would be greatly increased if it gave more detail and more analyses, and the destruction of the remainder of the edition by fire in 1927, led to additional field work and a revision and expansion of the bulletin in 1929 and 1930 by Professor Miller. This new report is nearly ready for printing.

Slate came in for attention in 1923 and following years at the hands of C. H. Behre, of Lehigh University. A report on the Slate of Northampton County was published as Bulletin M9, 312 pp. As all available copies of this report were burned in 1927, it is planned to incorporate it in a new bulletin covering all the slate in Pennsylvania now nearly ready for the printer.

The silica refractories of Pennsylvania on which our silica fire brick industry rests, were studied by E. S. Moore and T.





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G. Taylor of State College, and a 100-page report, Bulletin M3, was issued.

Many inquiries regarding lead and zinc about 1923 led to the preparation of Bulletin M5 on the lead and zinc ores of Pennsylvania.

The clays of Pennsylvania have been studied since 1925, beginning with the collecting of fire clay samples by Geo. Longcor and their complete testing in the ceramic laboratory at State College by Prof. J. B. Shaw. The next year a systematic survey of the clays of the State was begun by Prof. Henry Leighton, starting in the southwestern corner of the State. The samples collected are likewise being tested by Professor Shaw. A bulletin covering the result of this study in the Pittsburgh district is nearly ready for publication.

Iron ore resources were summarized by J. R. Corbin and R. P. Howell in considerable manuscripts awaiting publication. A study of the magnetite deposits of French Creek by L. L. Smith is in press.

The building stones of Pennsylvania have been investigated since 1924 by R. W. Stone. The report on them is awaiting publication.

Among minor mineral resources studied by the Survey have been glass sand by C. R. Fettke, molding sand by R. W. Stone, feldspar by Stone and H. H. Hughes, sand and gravel by Freeman Ward. These have led to the publications: Report No. 12, Glass Sands, 278 pp., Bulletin M 11, Molding Sands, 94 pp., Feldspar, in press, and several mimeograph bulletins on sand and gravel.

In 1926 a study of the underground water resources of the State was started in cooperation with the Water Resources Branch of the U. S. Geological Survey and using their personnel. To date field work has been completed on Southeastern Pennsylvania by G. M. Hall, on Southwestern Pennsylvania by A. M. Piper, on Northwestern Pennsylvania by R. M. Leggette. Reports on the results of this work are awaiting funds for publication. In 1930 the underground water resources of northwestern Pennsylvania are being examined by S. W. Lehman.

Geologic map of Pennsylvania. The outstanding project of the Survey is the making and publication of a detailed geologic map of Pennsylvania. This is surveyed and published by quadrangles corresponding to the topographic quadrangles. The field work requires the same painstaking surveying of the area as in topographic mapping, plus the detailed measuring of coals and other rocks, the collecting and plotting of drill records, the analysis or testing of minerals or rocks, and the deciphering of the geologic history. These maps summarize the detailed knowledge of the geology and mineral resources of the State.

Prior to the initiation of the present Survey, the U. S. Geological Survey partly in cooperation with the Pennsylvania Geological Survey Commission, had mapped the geology of 36 quadrangles or 17.4 per cent of the State and published folios of the same. The State shared equally in the cost of 27, the others having been





done without State aid. Since 1919 work has been continued partly by the State alone, partly by the Federal Government alone, but mainly in cooperation. As a result the Federal Survey has published the geology of 4 quadrangles, and has 9 in press and 9 more ready for publication. The State has published the results of 6 quadrangles, has 1 in press and 7 ready for printing. The 6 atlases published are A5 New Castle, by F. W. DeWolf; A27 Pittsburgh, by M. E. Johnson; A37 Greensburg, by M. E. Johnson; A 65 Punxsutawney, by Geo. H. Ashley; A178 New Holland, by A. Jonas and Geo. W. Stose; A206 Allentown, by B. L. Miller. A168 Lancaster, by A. Jonas and Geo. W. Stose is in press by the State, and the Federal Government has in press reports on the Coatesville, West Chester, Somerset, Windber, Hollidaysburg, Huntingdon, New Kensington, Quakertown, and Doylestown quadrangles. The following geologic atlases are ready or nearly ready for publication: Bellefonte, Tyrone, Zelienople, Butler, Middletown, Hanover, York, New Cumberland, and Bradford, and several other quadrangles are well advanced. The completion of this work, now only one-third finished, is the largest job before the Survey. Among Survey members engaged in this work at present, or in the past, in addition to those listed above are S. H. Cathcart, Confluence and Donegal quadrangles; Charles K. Graeber, Brookville quadrangle; H. H. Hughes, Freeport quadrangle; M. H. Bissell, New Cumberland quadrangle, and many others who assisted in the field surveys.

Correlated with the folio or atlas publications are county reports. The geology of Greene County, for example, was published in several folios about 25 years ago. As these have been out of print many years and as there has been an active promotion of mining and drilling enterprises in that county and therefore a demand for up-to-date information, a county report has been prepared by Mr. Stone. It is awaiting funds for publishing. A similar report on Adams County by Geo. W. Stose is also ready for printing, and the field work is now in progress by S. H. Cathcart for an up-to-date report on Fayette County. Washington County is listed for a report by Mr. Stone in the near future.

~~General geology.~~ General geology. Broad problems in geologic history, stratigraphy, ~~physiography~~, and glacial geology cannot be solved by local studies and often involve observations and discussion by many people working in widely scattered areas. The Survey has not neglected these problems, though its publications on them have been limited to the scientific journals or proceedings of scientific societies.

The largest single job in this line has been the preparation of a new geologic map of Pennsylvania. This has had the active cooperation of the U. S. Geological Survey and incorporates a large amount of unpublished mapping, especially in southeastern Pennsylvania where several of the old formations have been greatly subdivided. Thus, formation No. II of the Second Geological Survey is now divided into 17 formations; and in general the geology of that part of the State has been greatly revised.

The State Geologist has devoted some time to a study of the age and history of some of the physiographic features of the State, especially of the old erosion plain indicated by the flat tops of the mountains; a study of the method of naming the rock formations, seeking simplification; a better method of classifying



coals; a better understanding of the mode and meaning of the folding of the rocks; an attempt to settle certain disputed points in the stratigraphy of the State, and many minor studies. The State Geologist has completed a popular bulletin entitled Syllabus of the Geology and Mineral Resources of Pennsylvania, and has nearly ready a less popular bulletin, entitled The Rocks of Pennsylvania.

The Survey has now nearly ready for the printer a bulletin on the glacial and recent history of Pennsylvania, containing papers by the State Geologist, H. L. Fairchild, Frank Leverett, M. R. Campbell, Harry A. Itter, and Freeman Ward. Broad stratigraphic studies are in progress on the Devonian by Bradford Willard, on the Silurian by Frank Swartz, on the relation of the Silurian and Ordovician, by G. W. Stose and others, on the stratigraphy of northwest Pennsylvania by G. H. Chadwick.

Among minor geologic studies, one by Mr. Stone, Bulletin G3, Pennsylvania Caves, 63 pp., is proving of popular interest. A number of studies are in progress in the State by university students working for advanced degrees, and the State Geologist is in touch with many local students of geology, who are listed in the Survey files as correspondents.

Financial. The appropriations for the Survey have run as follows:

<u>Appropriations</u>		<u>Expenditures</u>	
1919-1921	\$100,000	Topography	\$ 232,485.29
1921-1923	150,000	Mineral resources	124,576.63
1923-1925	110,000	Areal geology	65,440.49
1925-1927	135,000	General geology	36,238.17
1927-1929	135,000	Ground waters	5,485.75
		Information service	60,202.56
		Publication—drafting, text	28,967.15
		Administration, equipment, supplies, etc.	76,523.90
		Reverted	80.06
Total	\$ 630,000		\$ 630,000.00
1929-1931	\$ 150,000		

